On the Action of detached Leaves of Plants. By Thomas Andrew Knight, *Esq. F.R.S. In a Letter addressed to the Right Hon. Sir* Joseph Banks, *Bart. G.C.B. P.R.S.* Read June 13, 1816. [*Phil. Trans.* 1816, *p.* 289.]

Mr. Knight having on a former occasion inferred, from his experiments and observations, that the true sap of trees, from which the living parts are generated, owes its properties to having circulated through the leaves, now adduces other facts, more directly in point, to show that a fluid similar to the true sap actually descends through the leaf-stalks.

A transverse section was made through the bark of a vine, at the middle of the insertion of the leaf-stalk, by passing a slender knife through the stalk, so as to split it for about two thirds of an inch above its insertion.

Another transverse incision of the bark having also been made nearly an inch below, these sections were joined by longitudinal incisions at each end, so that a piece of the bark, half an inch broad and nearly one inch long, could be detached from the stem, still remaining united to the lower half of the split leaf-stalk. Being afterwards protected on all sides from the air by waxed paper, it was found to grow in all its dimensions, and to have thin layers of alburnum deposited upon its interior surface.

In a second experiment, leaves from the potatoe were taken at the period when the tuberous roots were beginning to form, and were planted in pots, under the expectation that these leaves even alone might have power to form tubers. The effect, however, was not exactly as the author had anticipated; but the power was manifested by the production of a conical swelling at the lower part, more than two inches in circumference, apparently similar in composition to a tuber, and retaining life to the following spring.

Leaves of mint, also detached in the same manner, were found to throw out roots, and to continue alive through the winter, assuming the character and hue of those of evergreen trees.

Since it had appeared, from former experiments, that the growth of immature leaves depends upon matter afforded by those already arrived at a state of maturity, Mr. Knight cut off several shoots of a vine, and laying them over basins of water, immersed portions of the larger leaves; and he found that under these circumstances the young leaves continued to grow for upwards of a month, during which they necessarily depended on the larger leaves for their supply of nourishment.

The progress of fruit, likewise, is proved to depend upon the mature leaves; for if these be destroyed, the fruit ceases to grow, and gains nothing in ripeness or flavour: and, accordingly, those trees alone are capable of ripening fruit during winter which retain their leaves at that season, of which the Orange, Lemon, Ivy, and Holly, are familiar examples.

With regard to the period during which the true sap is accumu-

lated as store for future growth, and returned from its reservoirs into the circulation, it may be difficult clearly to discover anything certain; but the author has not ceased to prosecute his experiments on the varying density of the alburnum, and other parts of the wood, and on the proportion of moisture which they lose by drying; and he hopes at some future time to lay before the Society his observations, showing how far the durability of the heart wood depends on the period at which a tree is felled.

On the Manufacture of the Sulphate of Magnesia at Monte della Guardia, near Genoa. By H. Holland, *M.D. F.R.S.* Read June 13, 1816. [*Phil. Trans.* 1816, *p.* 294.]

The site of this manufactory is about eight miles N.W. of Genoa, at about 1600 feet above the level of the sea, from which the top of the mountain is five miles distant, and elevated about 2000 feet. The ascent from Sestri is by a deep ravine, the course of a torrent, the eastern side of which is composed of serpentine in vast masses, lying unconformably on primitive schist, and containing talc, steatite, asbestus, and many small veins of pyrites. On the western side of the ravine are mountains of magnesian limestone. In passing to the upper end of this ravine, the stratification of the primitive schist appears mixed with chlorite, slate, and other magnesian minerals, and containing numerous veins or layers of pyrites, both of copper and iron. The substance of these ores is schistose, as well as the rock in which they lie, and they are so intimately mixed with the same magnesian minerals, as to feel unctuous to the touch. These, together with a certain portion of magnesian limestone, are the materials used in the manufacture of the sulphate of magnesia, in an establishment originally set up for converting copper and iron pyrites into sulphates of those metals.

The sulphate of magnesia was at first observed only as an accidental product, but has now become the principal object of the work. For this purpose the pyrites is extracted from the mountain by tunnels, the largest of which is about 200 feet in length, and from 10 to 15 feet wide. The ore is then broken into small pieces, roasted for about ten days, and being then collected in heaps, is kept moist with water for several months, during which the salts are forming. The materials are then lixiviated, and after the liquor has been filtered through sand, the copper is first precipitated by refuse iron, after which a portion of lime, prepared from the magnesian limestone of the adjacent mountain, is added, in order to precipitate the iron, and at the same time to make some addition to the product of sulphate of magnesia.

The circumstance particularly to be attended to in this process, is the proportion of lime employed, which in general does not exceed $\frac{1}{10}$th of the weight of ore. For if this were added in excess, it would occasion the precipitation of the magnesia along with the metals. The whole produce of this manufactory, we are told, does